DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA 725)
Current Human Exposures Under Control

Facility Name: **Former Tecumseh Products (Tecumseh Compressor) Company Site**
Facility Address: **100 E. Patterson, Tecumseh, Michigan**
Facility EPA #: **MID 005 049 440**

1. Has all available relevant/significant information on known and reasonably suspected releases to from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

X If yes -check here and continue with #2 below.
_ If no- re-evaluate existing data, or
_ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)
Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI
A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies
While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near- term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations
EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS Code (CA 725)

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated" above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs (1,1,1-TCA, TCE, PCE, VC)
Air (indoors)[2]	X			VOCs (primary concern TCE)
Surface Soil (e.g. <2ft)	X			VOCs (1,1,1-TCA, TCE, PCE, VC)
Surface Water		X		TCE exceeds chronic criteria and vents to seeps adjacent to river.
Sediment		X		Sediment not sampled at GSI discharges; low level VOCs expected to volatilize at surface.
Subsurface Soil (e.g., >2 ft)	X			VOCs (1,1,1-TCA, TCE, PCE, VC)
Air (outdoors)		X		Outdoor air not sampled, screening criteria exceeded in deep soil, site vacant.

_ If no (for all media) -skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

X If yes (for any media) -continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_ If unknown (for any media) -skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater is impacted by volatile organic compounds (VOCs), primarily but not limited to PCE, TCE, cis-1,2-DCE, and vinyl chloride at levels above Maximum Contaminant Levels (MCLs), MDEQ's Residential Vapor Intrusion Shallow Groundwater Screening Levels ($GW_{VI\text{-}sump\text{-}res}$), Residential Vapor Intrusion Groundwater Screening Levels ($GW_{VI\text{-}res}$), Nonresidential Vapor Intrusion Shallow Groundwater Screening Levels $GW_{VI\text{-}sump\text{-}nr}$, Nonresidential Vapor Intrusion Groundwater Screening Levels $GW_{VI\text{-}nr}$, Surface Water Human Drinking Water Values (HDV), Default Groundwater Surface Water Interface screening criteria, and Residential and Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria (Part 201 Generic Cleanup Criteria and Screening Levels and/or May 2013 Guidance Document for the Vapor Intrusion Pathway). The extent of groundwater impacts exceeding each criteria is generally defined. Trend tests for contaminants in groundwater at MW-21 and MW-23 indicate the plumes may be expanding, though concentrations have leveled somewhat since 2015. Groundwater monitoring, in connection with a mixing zone evaluation, has identified that groundwater discharges through seeps to the river Raisin, and MDEQ has recently determined that the plume venting to seeps must meet the Final Chronic Value, and that the plume venting to the River Raisin must meet the Final Acute Value. At present, the data show acceptable levels for surface water (<acute) but discharges to the seeps must be addressed through long term remedial actions to ensure protection of the wetlands and achieve chronic levels. The potential for exposure to contaminated groundwater by ingestion is eliminated by a City Groundwater Ordinance, dated June 6, 2011, and recorded with Lenawee County Register of Deeds on

September 21, 2016, Liber 2532, Page 0965, 1 of 7. The potential for exposure to contaminated groundwater by direct contact was addressed by the development of a site-specific cleanup objective for construction worker exposure at the former TPC facility.

Soil is impacted by VOCs at levels exceeding Residential and Nonresidential Vapor Intrusion Screening Levels ($S_{VI\text{-}res}$ and $S_{VI\text{-}nr}$), Residential and Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria, Residential and Nonresidential Infinite Source Volatile Soil Inhalation Criteria (VSIC), Residential and Nonresidential Finite VSIC for 2 and 5 Meter Sources, Soil GSI Protection Criteria for HDV, Groundwater Surface Water Interface Protection Criteria, Residential and Nonresidential Drinking Water Protection Criteria (Part 201 Generic Cleanup Criteria and Screening Levels and/or May 2013 Guidance Document for the Vapor Intrusion Pathway). The extent of soil impacts exceeding each criteria was investigated in multiple stages from 2008 through 2016 and was generally delineated relative to the screening criteria for each current and future exposure pathways, as shown on the Figure in the September 16, 2016 Declaration of Restrictive Covenant, recorded September 27, 2017 with the Lenawee County Register of Deeds, Liber 2533, page 0341 (1 of 18). The site is vacant, limiting the potential for on-site exposures, and the Restrictive Covenant and License Agreement with the new site owner (100 Patterson LLC) will ensure that exposures pathways (primarily related to vapor intrusion) are eliminated with respect to future uses. Shallow soils are impacted in at least one area above levels that have the potential to exceed the screening criteria for ambient air, and the areas are targeted for cleanup via excavation and disposal and/or SVE treatment as outlined in the March 3, 2017 revised Corrective Measures Proposal. Deep soils are also impacted above the levels that have the potential to exceed the screening criteria for ambient air, however the planned remediation in certain areas, and the depth of contamination (below the water table) limit the potential impacts to ambient air. Though sediments off-site were not specifically sampled, the surface discharges and low concentrations found in seep water would likely be more susceptible to volatilization than infiltration.

Soil gas is contaminated with VOCs at levels exceeding the Residential and Nonresidential Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels ($SG_{VI\text{-}SS\text{-}res}$ and $SG_{VI\text{-}SS\text{-}nr}$), and the Residential and Nonresidential Vapor Intrusion Deep Soil Gas Screening Levels ($SG_{VI\text{-}res}$ and $SG_{VI\text{-}nr}$). The extent of impacts is loosely defined. The site is currently vacant, minimizing on-site exposures, and an operative SVE system is reducing VOC levels in indoor air in a portion of the existing onsite building. Testing results completed by the developer in April 2016 demonstrate that the system is operating effectively. Off-site exposures to soil gas emanating from contaminated soil and/or groundwater has been addressed in the majority of key areas by performing indoor air sampling or installing presumptive remedies to demonstrate that the pathway is incomplete. Modeling calculations performed by TPC generated predicted values that approximated contaminant conditions measured in the field, and indicate that the exposures are presently under control, though long term treatment is required to reduce groundwater contamination to levels off-site that meet the residential (unrestricted) calculated site-specific level (approximately 130 ppb for TCE). The site is currently vacant and future exposure will be managed on-site using the September 16, 2016 Declaration of Restrictive Covenant, recorded September 27, 2017 with the Lenawee County Register of Deeds, Liber 2533, page 0341 (1 of 18), and the License Agreement with the new owner will ensure that exposures pathways (primarily related to vapor intrusion) are eliminated with respect to future uses.

Indoor Air is impacted by VOCs at levels exceeding the Residential and Nonresidential Vapor Intrusion Indoor Air Screening Levels ($IA_{VI\text{-}res}$ and $IA_{VI\text{-}nr}$). Mitigation systems have been installed in some on-site and off-site areas where known exceedances have been documented, or pre-emptively without prior sampling. Impacts will continue to be evaluated as part of the performance monitoring associated with proposed Corrective Measures to ensure that the evaluation of off-site exposures to indoor air from contaminated soil gas, soil, and/or groundwater is complete. EPA and MDEQ are currently evaluating the locations of monitoring locations that will be required for long-term performance monitoring of soil gas, indoor air, and groundwater, in response to TPC's submittal of a revised Corrective Measures Proposal on March 6, 2017.

Outdoor air has not been sampled, however the planned remedial activities by Tecumseh Products and the soil management plan to be developed by 100 Patterson, LLC will be used to manage and address soil contaminated above levels with the potential to volatilize to outdoor air. The September 16, 2016

Declaration of Restrictive Covenant, recorded September 27, 2017 with the Lenawee County Register of Deeds, Liber 2533, page 0341 (1 of 18), and the License Agreement identify the areas of contamination. The soil management plan should be completed by late summer or early fall, and the site is presently vacant. The developer has indicated that some form of vapor barrier will be installed when in-place concrete slabs are removed.

References:

2017-05-24, MDEQ, Draft *Implementation of a Mixing Zone Request.*
2017-05-10, TRC, *Vapor Intrusion Decision Matrix (Addendum to Appendix H of CMP).*
2017-03-06, TRC, *Revised Corrective Measures Proposal.*
2017-02-08, TRC, *[Response to] EPA Comments on Human Health and Ecological Risk Assessment.*
2017-01-16, TRC, *Construction Documentation Report 2016 PCE Source Removal.*
2016-11-11, TRC, *Evaluation of Risk Associated with Areas of Interest and Development of Approximate Soil Cleanup Effort using a Soil Leaching Model*
2016-09-20, TRC, *Human Health and Ecological Risk Assessment*
2016-08-24, TRC, *Technical Memorandum: Summary of 2016 Soil Investigation Activities.*
2016-04-26, AKT, *Air 72139 Laboratory Report (P-Building).*
2015-07-31, TRC, *Supplement to Remedial Investigation and Environmental Indicator Report*

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that Unacceptable indoor air concentrations are more common in structures above groundwater with volatile Contaminants than previously believed. This is a rapidly developing field and reviewers are e encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile organic compounds) does not present unacceptable risks.

3. Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
Potential Human Receptors (Under Current Conditions)

"Contaminated" Media	Resident	Worker	~~Day-Care~~	Constr-uction	Tres-Passer	~~Recre-ation~~	~~Food~~[3]
Groundwater	No	Yes		Yes	No		
Air (indoors)[2]	Yes	No		No	No		
Surface Soil (<2 ft)	No	Yes		Yes	Yes		
~~Surface Water~~	No	No		No	No		
~~Sediment~~	No	No		No	No		
Subsurface Soil (>2 ft)	No	Yes		Yes	No		
Air (outdoors)	No	Yes		Yes	Yes		

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "Contaminated") as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor combination (Pathway). N/L = Not Likely

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media- Human Receptor combinations (Pathways) do not have check spaces ("-"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

X If yes (pathways are complete for any "Contaminated" Media -Human Receptor combination) -continue after providing supporting explanation.

_ If unknown (for any "Contaminated" Media -Human Receptor combination) -skip to #6 and enter "IN" status code

Rationale and Reference(s):
Subsurface soils and groundwater are contaminated by historical site activities. The site is currently vacant, eliminating the current potential for on-site exposures. The possibility of exposures to construction workers and site workers exists for contact with soil, groundwater, and inhalation of vapors, however, site specific calculations show that the exposure potential is limited and concentrations are below the calculated cleanup objectives for construction workers. Groundwater is generally deeper than 20', except in the southeast corner of the site. A soil management plan will be prepared to address the potential for contaminated soils to be encountered during construction, and vapor mitigation controls will be installed at the site to address future exposure potential. Exposure to trespassers is currently limited by a perimeter fence. Contaminated groundwater extends off-site. Testing of certain off-site properties has identified that

the pathway is complete, but that the exposures are under control because concentrations have been below the screening criteria for indoor air, or are being controlled with sub slab mitigation systems. A Groundwater Ordinance is being used to prevent the ingestion of contaminated groundwater within the area of known impact, and potential exposures via vapor intrusion will be managed during treatment of contaminated soil and groundwater through a combination of monitoring and presumptive mitigation (where those systems have been installed or are determined to be necessary off-site if conditions change). Revised restrictive covenants are being used to restrict on-site land use and eliminate the groundwater ingestion pathway, but additional controls are needed for proposed future buildings, and may be needed temporarily for off-site residences with mitigations systems. Source reduction is required to eliminate off-site exposures in the long term.

References:

2017-05-24, MDEQ, Draft *Implementation of a Mixing Zone Request.*
2017-05-10, TRC, *Vapor Intrusion Decision Matrix (Addendum to Appendix H of CMP).*
2017-03-06, TRC, *Revised Corrective Measures Proposal.*
2017-02-08, TRC, *[Response to] EPA Comments on Human Health and Ecological Risk Assessment.*
2017-01-16, TRC, *Construction Documentation Report 2016 PCE Source Removal.*
2016-11-11, TRC, *Evaluation of Risk Associated with Areas of Interest and Development of Approximate Soil Cleanup Effort using a Soil Leaching Model*
2016-09-20, TRC, *Human Health and Ecological Risk Assessment*
2016-09-16, *Declaration of Restrictive Covenant, recorded September 27, 2017 with the Lenawee County Register of Deeds, Liber 2533, page 0341 (1 of 18)*
2016-08-24, TRC, *Technical Memorandum: Summary of 2016 Soil Investigation Activities.*
2016-04-26, AKT, *Air 72139 Laboratory Report (P-Building).*
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Footnotes:

[3]Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4 Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be "significant" (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

X If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) -skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) -continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_ If unknown (for any complete pathway) -skip to #6 and enter "IN" status code

Rationale and Reference(s):

Refer to exposure pathways evaluated in Step Three of the EI determination process:

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) – continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

YE -Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" under current and reasonably expected conditions at the former **Tecumseh Products Company** site, **EPA ID # MID 005 049 440**, located at **100 East Patterson, Tecumseh, Michigan**. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

NO -"Current Human Exposures" are NOT "Under Control."

IN -More information is needed to make a determination of "Current Human Exposures Under Control".

Completed by (signature) Date Aug. 14, 2017 6/14/17
(print) Joseph Kelly
(title) Corrective Action Project Manager

Supervisor {signature) Date Aug. 14, 2017 6/14/17
print) Michael Beedle
(title) Chief, LCD, RRB, Corrective Action Section I
(EPA Region or State) US EPA Region 5

Locations where References may be found: The documents below referencing this Tecumseh Products Company CA 725 Determination can be found in the 7th Floor Records Center, 77 W. Jackson, Chicago, IL 60604.

Contact telephone and e-mail numbers

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FINAL NOTE: The human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.